Small Business Innovation Research/Small Business Tech Transfer

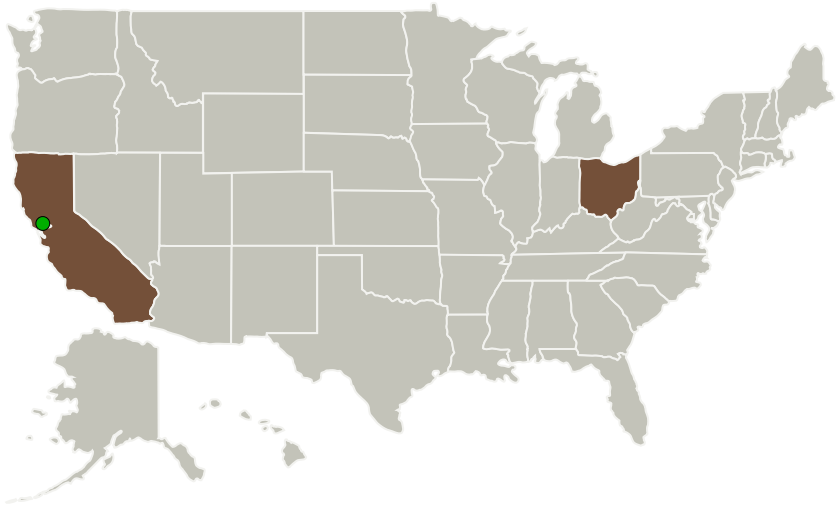
Next Generation Water Recovery for a Sustainable Closed Loop Living, Phase I

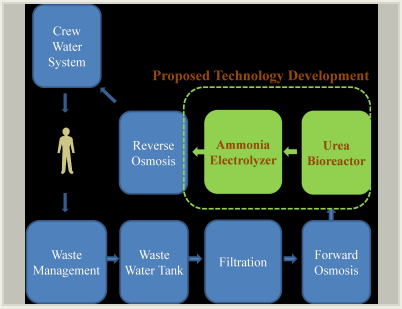
Completed Technology Project (2017 - 2018)

Project Introduction

Among the numerous technological advances sought in order to facilitate human space travel, solutions and innovations are needed for techniques that supports the mass- and energy-efficient maintenance of closed air, water, and waste systems in spacecraft habitats that operate within microgravity. As missions are foreseen to be extended with limited earth resupply available there is need to develop durable and sustainable closed loop living systems. Waste water treatment and recovery system that is managed by ECLSS on board the ISS is one such system that has lifetime/durability limitations and would benefit from improvements to increase its lifetime efficiency. Therefore, in order to achieve NASA?s goals of extended manned deep space missions, Faraday Technology Inc. and Dr. Carlos Cabrera of the University of Puerto Rico (UPR) propose to develop a technique to eliminate many of the contaminants that commonly foul the waste water treatment system and produce a more durable closed loop process compatible with existing ECLSS mainframe to treat and recover water. In this program, UPR will develop enzyme based bio-reactor to efficiently convert urea to ammonia, while Faraday will scale and optimize ammonia electrolyzer incorporating custom-fabricated gas diffusion cathode and anode. This integrated system is anticipated to enable significant performance enhancement by reducing osmosis membrane fouling caused by contaminants from the waste stream and thereby increasing the efficiency and durability of the treatment process. This technology has the potential to be compatible with existing ECLSS systems and be an integral part of the closed loop living systems required for long term life support on NASA?s manned space missions.

Primary U.S. Work Locations and Key Partners





Next Generation Water Recovery for a Sustainable Closed Loop Living, Phase I Briefing Chart Image

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

Small Business Innovation Research/Small Business Tech Transfer

Next Generation Water Recovery for a Sustainable Closed Loop Living, Phase I

Completed Technology Project (2017 - 2018)

Organizations Performing Work	Role	Type	Location
Faraday Technology, Inc	Lead Organization	Industry	Clayton, Ohio
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Ohio
Puerto Rico	

Project Transitions

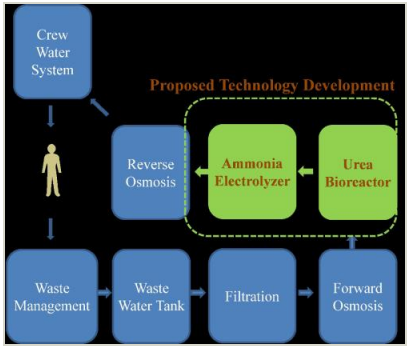
June 2017: Project Start

June 2018: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140857)*

Images



Briefing Chart Image
Next Generation Water Recovery for a Sustainable Closed Loop Living, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/130499)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Faraday Technology, Inc

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

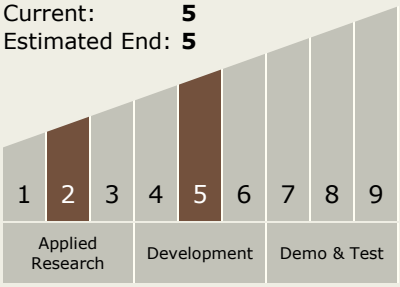
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Santosh Vijapur

Technology Maturity (TRL)

Start: **2**
Current: **5**
Estimated End: **5**



Next Generation Water Recovery for a Sustainable Closed Loop Living, Phase I

Completed Technology Project (2017 - 2018)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.2 Water Recovery and Management

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System